

REMARKS

Applicants appreciate the Examiner's thorough consideration provided the present application. Claims 37, 40, 42 and 44 are now present in the application. Claims 37 and 42 have been amended in this Reply. Claims 38, 39, 41 and 43 have been cancelled. Claim 37 is independent. Reconsideration of this application, as amended, is respectfully requested.

Interview With The Examiner

An interview was conducted with the Examiner in charge of the above-identified application on January 26, 2010. Applicants greatly appreciate the courtesy shown by the Examiner during the interview.

During the interview with the Examiner, Applicants' representative presented argument with regard to the rejection under 35 U.S.C. §§ 102 and 103. The substance of the interview can be seen in the Interview Summary dated February 3, 2010. However, no agreement has been reached during the interview.

Claim Rejections Under 35 U.S.C. §§ 102 & 103

Claims 37 and 39-43 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kobayashi, U.S. Patent No. 4,829,022. Claims 37-43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishizawa, U.S. Patent No. 5,693,139, in view of Kobayashi. Claim 44 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishizawa in view of Kobayashi, and further in view of Edmond, U.S. Patent No. 5,739,554, and Manabe, U.S. Patent No. 6,472,690. These rejections are respectfully traversed.

Independent claim 37 has been amended to incorporate the subject matter of claim 38. In particular, independent claim 37 has been amended to recite a combination of steps including “supplying a first crystal raw material to form a first layer; after the step of supplying a first crystal raw material stops, supplying a second crystal raw material different from the first crystal raw material to form a second layer on the first layer; supplying at least one p-type impurity raw material and at least one n-type impurity raw material before the step of supplying the second crystal raw material, thereby doping an impurity pair of the at least one p-type impurity raw material and the at least one n-type impurity raw material into only the first layer, wherein a kind of impurity pairs composed of the p-type impurity raw material and the n-type impurity raw material are formed in the first layer, wherein the step of supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material includes: supplying one of the at least one p-type impurity raw material and the at least one n-type impurity raw material; and after the step of supplying one of the at least one p-type impurity raw material and the at least one n-type impurity raw material, supplying the other one of the at least one p-type impurity raw material and the at least one n-type impurity raw material.”

Applicants respectfully submit that the above combination of elements as set forth in amended independent claim 37 is not disclosed nor suggested by the references relied on by the Examiner.

The Examiner alleged that Kobayashi in col. 12, lines 35-50 discloses “supplying at least one p-type impurity raw material and at least one n-type impurity raw material before the step of supplying the second crystal raw material, thereby doping an impurity pair of the at least one p-

type impurity raw material and the at least one n-type impurity raw material into only the first layer” as recited in claim 37. Applicants respectfully disagree.

Applicants concurrently submit a Declaration under 37 C.F.R. § 1.132 (see Attachment) showing that Kobayashi’s teaching of concurrent supply of impurities will cause the p-type and n-type dopants to maintain their non-molecular state, while non-concurrent supply of impurities in the present invention will make the p-type impurity raw material and the n-type impurity raw material co-doped molecularly side-by-side to produce impurity pairs. Therefore, semiconductor crystals produced by the present invention and Kobayashi are significantly different from each other.

In addition, in the present invention, since the p-type impurity raw material and the n-type impurity raw material co-doped molecularly side-by-side, the respective wave functions are overlapped with each other, so that acceptor level can shallow due to doping of P-type and n-type impurities. Therefore, activation energy decreases and the number of carrier increases, resulting in improvements of conductivity. These features are clearly absent from Kobayashi and the other utilized references.

With regard to the Examiner’s reliance on the other secondary references, these references have only been relied on against dependent claim 44. These references also fail to disclose the above combination of steps as set forth in amended independent claim 37. Accordingly, this reference also fails to cure the deficiencies of Nishizawa and Kobayashi.

Accordingly, none of the utilized references individually or in combination teach or suggest the limitations of amended independent claim 37. Therefore, Applicants respectfully

submit that amended independent claim 37 clearly define over the teachings of the utilized references.

In addition, claims 40, 42 and 44 depend, either directly or indirectly, from independent claims 37, and are therefore allowable based on their respective dependence from independent claim 37, which is believed to be allowable.

In view of the above remarks, Applicants respectfully submit that claims 37, 40, 42 and 44 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §§ 102 and 103 are respectfully requested.

CONCLUSION

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Cheng-Kang (Greg) Hsu, Registration No. 61,007 at (703) 205-8000 in the Washington, D.C. area.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicants respectfully petition for a two (2) month extension of time for filing a response in connection with the present application.

Application No. 09/941,612
Reply dated March 29, 2010
Reply to Office Action of October 29, 2009

Docket No.: 1794-0141P

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

By  #61007

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Attachment: Declaration under 37 C.F.R. §1.132